

Though the Office Action provides discussion of the rejections to claims 1, 2, 6, and 13, it does not provide discussion of the rejections to remaining claims 3-5, 7-12, and 14-21. Therefore, in the absence of such discussion, the Applicant will respond to the rejections of claims 1, 2, 6, and 13. As will be set forth in more detail below, the § 112, second paragraph, rejection of claims 1, 2, 6, and 13 is hereby respectfully traversed.

In particular, claim 13 recites, “[t]he gas scrubber according to claim 9, wherein the multiple heat exchange units comprise a first row and a second row of heat exchange units, and wherein if power to the first row of heat exchange units is terminated, power to the second row of heat exchange units is increased.” However, the Office Action states, “[i]n claim 13, it is unclear as to where it is disclosed in the specification” (Office Action, page 3). The limitations of claim 13 are disclosed in the Specification, for example, on page 7, lines 4-8 of the amended Specification (*see* Attachment A of the Response to the Office Action mailed October 4, 2000). Consequently, removal of the § 112, second paragraph, rejection of claim 13 is respectfully requested.

**Claims 1 and 2 are definite since claims 1 and 2 particularly point out and distinctly claim the subject matter which applicant regards as the invention.** Claim 1 recites in part: “[a] gas scrubber comprising ... an injection nozzle having an opening adapted to deliver a conditioned gas to a space proximate to the guide plate for minimizing the production and/or accumulation of a powder at an interface between the combustion chamber and the wetting chamber.” In addition, claim 2 recites: “[t]he gas scrubber according to claim 1, wherein the combustion chamber is adapted to burn flammable elements of the gas.”

The Office Action states, however, “it has been held that the recitation that an element is ‘adapted to’ perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchison*, 69 USPQ 138” (Office Action, page 2). On the contrary, the decision of *In re Hutchison* does not address whether an element ‘adapted to’ perform a function constitutes a patentable limitation. Instead, the decision of *In re Hutchison* addresses whether an article adapted for use in a particular process constitutes a patentable limitation. In particular, the decision of *In re Hutchison* addresses “... an article of manufacture, adapted for use in the fabrication of a metal template...,” as recited in claim 42 of the application for patent *In re Hutchison*, by stating an “article ... ‘*adapted*’ for use in making a template ... does not constitute a limitation in any patentable sense ... .” *In re Hutchison*, 69 USPQ 138. As noted above, claims 1 and 2 each disclose a structural element (i.e., an injection nozzle and a combustion chamber, respectively) adapted to perform a function

(i.e., deliver a conditioned gas and burn flammable elements of a gas, respectively) – and does not merely introduce the structural elements as adapted for use in a particular process. Therefore, the decision of *In re Hutchison* – that an element adapted for use in a particular process does not constitute a limitation in any patentable sense – does not apply to the claim language as recited in present claims 1 and 2.

In addition, the Office Action states “‘adapted to’ is vague and indefinite as it is unclear as to whether the nozzle does in fact deliver the conditioned gas as claimed in claim 1 ... or whether the combustion chamber does in fact burn flammable elements of the gas ... .” (Office Action, page 2). On the contrary, the aforementioned claim terminology is used to impart proper functional limitations upon the structural elements of claims 1 and 2. In other words, the use of such terminology may define a claim element (e.g. an injection nozzle or a combustion chamber) by what it does, rather than by what it is. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971), MPEP 2173.05(g). In fact, functional limitations, like any other claim limitations, must be evaluated and considered for what they fairly convey to a person of ordinary skill in the pertinent art. MPEP 2173.05(g). Such an evaluation may be used to show that functional limitations are definite and proper, as illustrated by more recent court decisions.

For example, claim language calling for a sleeve “adapted to be fitted” over an insulating jacket has been ruled to impart structural limitation to the sleeve rather than to merely direct activities which may take place in the future. *In re Venezia*, 189 USPQ 149 (CCPA 1976), MPEP 2173.05(g). The court’s opinion states in part: “As we view these claims, they precisely define a group or “kit” or interrelated parts. These interrelated parts may or may not be later assembled to form a completed connector. But what may or may not happen in the future is not a part of the claimed invention. The claimed invention does include present structural limitations on each part, which structural limitations are defined by how the parts are to be interconnected in the final assembly, if assembled.” (Emphasis in original). The opinion further states: “Again, a present structural configuration for the housing is defined in accordance with how the housing interrelates with the other structures in the completed assembly...More particularly, we find nothing indefinite in these claims. One skilled in the art would have no difficulty in determining whether or not a particular collection of components infringed the collection of interrelated components defined by these claims.”

A similar line of reasoning may be properly applied to the functional limitations in present claims 1 and 2. For example, a limitation on an injection nozzle to deliver a conditioned gas defines the injection nozzle to include an interrelation of one or more components for delivering the conditioned gas.

Likewise, a limitation on a combustion chamber to burn flammable elements of a gas requires that the combustion chamber be configured to conduct a heating process of the gas. One of ordinary skill in the art would have no difficulty in determining whether an injection nozzle was adapted to deliver a conditioned gas, or whether a combustion chamber was adapted to burn flammable elements of a gas. The phrase “adapted to deliver” in claim 1 and the phrase “adapted to burn” in claim 2, therefore, provide positive limitations on the design of the injection nozzle and combustion chamber, respectively. Consequently, the use of the phrase “adapted to” in the present claims limits the present claims as to the function of the device, thereby proving the present claims to be definite.

Furthermore, Applicants note that upon searching the database of issued United States Patents, available on the United States Patent and Trademark Office website, 326,737 issued United States Patents were found containing the term “adapted to” in the claims. In addition, Applicants note that upon searching the database for United States Patents that were examined by Primary Examiner Marian Knode, 22 United States Patents were issued that contain the term “adapted to” in the claims. Moreover, Applicants note that upon searching the database for United States Patents that were examined by Hien Tran, 43 United States Patents were issued that contain the term “adapted to” in the claims. Therefore, the recitation of “adapted to” in the claims of these patents must not have been found to render the claims in these patents indefinite. As such, since claims including a recitation of “adapted to,” have been repeatedly recognized as allowable, and for at least the reasons set forth above, the claims currently under consideration cannot be considered indefinite based on this recitation. Consequently, the removal of the § 112, second paragraph, rejection of claims 1 and 2 is respectfully requested.

**In regards to claim 6, the statement in the Office Action suggesting “high” and “low” are relative terms and therefore are vague and indefinite is respectfully traversed.** The fact that claim language, including terms of degree, may not be precise, does not automatically render the claim indefinite under 35 U.S.C. 112, second paragraph. *Seattle Box Co., v. Industrial Crating & Packing, Inc.*, 731 F.2d 818, 221 USPQ 568 (Fed. Cir. 1984); MPEP 2173.05(b). Acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the Specification. When a term of degree is presented in a claim, first a determination is to be made as to whether the Specification provides some standard for measuring that degree. MPEP 2173.05(b).

In particular, claim 6 recites: “[t]he gas scrubber according to claim 5, wherein the combustion chamber comprises a relatively high temperature gas, wherein the wetting chamber comprises a relatively low temperature gas, and wherein the injection nozzle is adapted to prevent the high temperature gas from

coming in contact with a substantial portion of the low temperature gas.” As stated in a previous Response to the Office Action mailed May 17, 2002, the Specification does provide a standard for measuring the degree of a “relatively high temperature gas”. On page 9, lines 26-30, for example, the Specification states, “[t]he exhaust gas gains heat by passing through the heat exchange unit... [e]ach heat exchange unit includes a ceramic heater 15a, which raises the temperature of an outer surface of the heat exchange unit to 800°C, and as a result, the flammable gas, such as hydrogen, and explosive elements are burned in the combustion chamber 10.” As such, the Specification implicitly teaches a “relatively high temperature gas” as having a temperature near approximately 800°C, due to a transfer of heat between the heat exchange units and the exhaust gas. In any case, the Specification explicitly states that the temperature of the “relatively high temperature gas” must be high enough to burn flammable and explosive elements of the exhaust gas. Thus, in light of the Specification, one of ordinary skill in the art would understand that a “high” temperature, as described in claim 6, relates to well-known temperatures required to combust flammable elements of an exhaust gas.

Similarly, the Specification also provides a standard for measuring the degree of a “relatively low temperature gas.” For example, the Specification teaches that the “relatively high temperature gas” from the combustion chamber is passed into the wetting chamber where “the gas is cooled due to a cooling effect of water” (Specification, page 10, line 18). In this manner, the Specification describes an effect of the wetting chamber is to reduce the temperature of an exhaust gas from approximately 800°C to a “relatively low temperature.” In addition, the Specification provides a standard for measuring the degree of the “relatively low temperature” by describing a temperature difference between the “relatively high temperature gas” and the “relatively low temperature gas.” For example, on page 3, lines 24-28, the Specification states:

Due to the temperature difference between the combustion chamber and the wetting chamber, a powder or particulate buildup is created at the interface between the two chambers ... the powder results from the relatively hot gas of the combustion chamber contacting a cooler gas ... of the wetting chamber.

As such, the Specification implicitly teaches a temperature of the “relatively low temperature gas” as being substantially lower than the temperature of the “relatively high temperature gas,” such that a significant temperature difference between the two gases causes a powder formation. Thus, in light of the Specification, one of ordinary skill in the art would understand that a “relatively low temperature gas” relates to a temperature low enough to cause a powder formation when the high temperature gas comes in contact with the low temperature gas.

In addition, the Office Action states: "... applicant only discloses one temperature of 800°C. Does it mean that the temperature 800°C can be considered as 'high' as well as 'low'." (Office Action, page 2). As stated above, acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the Specification. When a term of degree is presented in a claim, first a determination is to be made as to whether the Specification provides some standard for measuring that degree. MPEP 2173.05(b), emphasis added. In this manner, it is not necessary for the Specification to explicitly teach numerical values for the claimed 'high' and 'low' temperatures, since such temperatures are dependent on process parameters (e.g., the 'high' temperature is dependent on the particular exhaust gas to be combusted). However, the Specification does provide a standard for measuring the degree of the 'high' and 'low' temperatures, as set forth in more detail above. In this manner, one of ordinary skill in the art would have no difficulty understanding a "high temperature gas" as relating to well-known temperatures required to combust flammable elements of an exhaust gas, and a "low temperature gas" as relating to a temperature difference that causes a powder formation when the "high temperature gas" comes in contact with the "low temperature gas".

Furthermore, the Office Action states, "the language of the claim is directed to method limitation which renders the claim vague and indefinite since it is unclear as to what structural limitation applicant is attempting to recite. Note that the gases are not parts of the apparatus." (Office Action, page 2). The Applicant respectfully disagrees, and asserts that the language of claim 6 is not directed to a method limitation, as suggested in the Office Action, but instead is used to impart proper functional limitations upon the structural elements (e.g., the injection nozzle, combustion chamber and wetting chamber) of the apparatus. A limitation on an injection nozzle to prevent a high temperature gas from coming in contact with a substantial portion of a low temperature gas, for example, defines the injection nozzle by what it does, rather than by what it is. As noted above, functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971), MPEP 2173.05(g). Therefore, the functional limitations recited in claim 6 do not render claim 6 vague and indefinite. Consequently, the removal of the § 112, second paragraph, rejection of claim 6 is respectfully requested.

### **Section 103 Rejections**

Claims 1-21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,900,217 to Hartung et al. (hereinafter "Hartung") in view of Korean Patent Publication 97-9311 to Kim (hereinafter "Kim"). To establish a case of *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580

(C.C.P.A 1974); MPEP 2143.03. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed.Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP 2143.01. The cited art does not teach or suggest each and every limitation of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

**None of the cited art provides motivation to teach or suggest a gas scrubber including an injection nozzle adapted to deliver a conditioned gas for minimizing the production and/or accumulation of a powder at an interface between a combustion chamber and a wetting chamber.** Independent claim 1 states in part: “[a] gas scrubber comprising ... an injection nozzle having an opening adapted to deliver a conditioned gas to a space proximate to the guide plate for minimizing the production and/or accumulation of a powder at an interface between the combustion chamber and the wetting chamber.” Independent claim 7 recites a similar limitation.

Hartung discloses an apparatus for purifying waste gases. Hartung, however, does not teach or suggest a gas scrubber including an injection nozzle adapted to deliver a conditioned gas for minimizing the production and/or accumulation of a powder at an interface between a combustion chamber and a wetting chamber. In one example, Hartung discloses “a spraying nozzle [18] for the absorbent and scrubbing agent is disposed within the outer pipe and above the burner ... for flushing the waste gases emerging from the combustion chamber and... at the same time cools the housing of the burner” (Hartung, column 2, lines 21-26). In this manner, Hartung specifically describes spray nozzle 18 as adapted to deliver an absorbent or scrubbing agent, which is otherwise referred to as a “flushing liquid” (Hartung, column 2, lines 27-30). In another example, Hartung discloses “a nozzle ring 19, with which water or an absorbent can be sprayed onto the inside of the inner pipe 16 during pauses in the operation, so that... deposits there can be removed or reduced” (Hartung, column 5, lines 12-15, emphasis added). In fact, the Office Action admittedly states, “Hartung et al disclose[s] an injection nozzle 19 for deliver[ing] water or absorbent” (Office Action, page 9). Therefore, Hartung does not teach or suggest an injection nozzle adapted to deliver a conditioned gas, as recited in present claims 1 and 7.

In addition, the invention of Hartung cannot be modified, such that spray nozzle 18 is adapted to deliver a conditioned gas, since such a modification would render the invention of Hartung unsatisfactory for its intended purpose. If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed

modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). For example, the invention of Hartung includes “spray nozzle 18 for supplying an absorbent ... for washing out the gaseous or solid reaction products formed during the combustion of the waste gas” (Hartung, column 4, lines 64-67). As a result, the water-soluble elements contained in the waste gas are removed. However, if the invention of Hartung were modified such that spray nozzle 18 supplied a conditioned gas – instead of an absorbent – spray nozzle 18 would no longer function to remove the reaction products (i.e., the water-soluble elements) formed during the combustion process. Therefore, Hartung provides no motivation to modify spray nozzle 18 to deliver a conditioned gas, since such a modification would render the invention of Hartung unsatisfactory for its intended purpose.

Furthermore, the invention of Hartung cannot be modified, such that nozzle ring 19 is adapted to deliver a conditioned gas – instead of water or an absorbent – since Hartung does not suggest the desirability of making such a modification. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990); MPEP 2143.01. In particular, Hartung does not teach or suggest that a conditioned gas could be used to minimize the production and/or accumulation of a powder. Therefore, Hartung cannot be modified to teach or suggest an injection nozzle adapted to deliver a conditioned gas for minimizing the production and/or accumulation of a powder at an interface between a combustion chamber and a wetting chamber, as recited in present claims 1 and 7. As such, the statement in the Office Action suggesting “[a]lthough nozzle 19 [delivers] water or absorbent, such [a] nozzle [is] capable of delivering other fluids, such as gas, provided that it is used for minimizing the accumulation of a powder/deposits” (Office Action, page 10), is hereby respectfully traversed.

Moreover, Kim cannot be combined with Hartung to overcome the deficiencies therein. In particular, Kim does not teach or suggest a gas scrubber including an injection nozzle adapted to deliver a conditioned gas for minimizing the production and/or accumulation of a powder at an interface between a combustion chamber and a wetting chamber. Kim does disclose that conventional gas scrubbers often require “frequent maintenance... due to a formation of a powder in the area where the gas flowing out from the gas chamber makes contact with water...” (Kim, page 2, lines 14-15). In addition, Kim discloses that the disadvantage of conventional gas scrubbers is “[w]henver the gas scrubber needs to be repaired, the main manufacturing system that produces the exhaust gas is put on hold thus effecting the productivity.” (Kim, page 2, lines 16-17).

As an improvement over conventional gas scrubbers, however, the invention of Kim includes a gas scrubber in which “wet chamber 40 is constructed with a main component comprised of the outer wall 46 and a detachable component having the partitions 42, 43, 44, 45. These components are assembled together with a flange coupled with a bolt 32, thus cleaning or repairing the device could be performed conveniently.” (Kim, page 8, lines 4-8). In this manner, Kim’s solution to the problem of powder formation is to construct a gas scrubber, which can be conveniently disassembled for cleaning or repairing purposes. Therefore, Kim does not teach or suggest a gas scrubber including an injection nozzle adapted to deliver a conditioned gas for minimizing the production and/or accumulation of a powder at an interface between a combustion chamber and a wetting chamber, as taught in present claims 1 and 7.

In addition, the invention of Kim cannot be modified to include an injection nozzle adapted to deliver a conditioned gas, as recited in the present claims, since Kim does not suggest the desirability of making such a modification. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990); MPEP 2143.01. In fact, Kim does not even mention the manner in which the device can be cleaned, i.e., how the powder can be removed from the area where the gas flowing out from the gas chamber makes contact with water. Therefore, Kim provides no motivation to teach or suggest an injection nozzle adapted to deliver a conditioned gas for minimizing the production and/or accumulation of a powder at an interface between a combustion chamber and a wetting chamber, as recited in present claims 1 and 7.

Since none of the cited art teaches, suggests, or provides motivation for the aforementioned limitation, the cited art cannot be combined to teach or suggest such a limitation. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed.Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP 2143.01.

For at least the reasons set forth above, none of the cited art provides motivation to teach or suggest all limitations of independent claims 1 and 7. Therefore, independent claims 1 and 7, as well as claims dependent therefrom, are asserted to be patentably distinct over the cited art. Accordingly, removal of the § 103(a) rejections of claims 1-21 is respectfully requested.

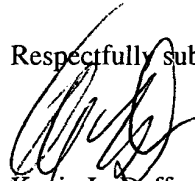


### CONCLUSION

This response constitutes a complete response to all issues raised in the Office Action mailed October 17, 2002. In view of the remarks traversing the rejections, Applicants assert that pending claims 1-21 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned attorney earnestly requests a telephone conference.

No fees are required for filing this amendment; however, the Commissioner is authorized to charge any additional fees, which may be required, or credit any overpayment, to Conley, Rose & Tayon, P.C. Deposit Account No. 50-1505/5480-00201.

Respectfully submitted,



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